
FRBSF WEEKLY LETTER

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Commodity Prices and Inflation

With the jumps in consumer and producer prices earlier this year, inflation is now running above a six percent annual rate, compared to around four percent last year. Many wonder whether the economy is headed for even higher inflation, while others contend that inflation could subside in coming months. To get a reading on the direction of inflation, many analysts and policymakers used to look at the growth rate of the M1 monetary aggregate, since movements in this aggregate preceded movements in inflation in a fairly reliable fashion. These days, M1 no longer appears to be a reliable guide, making the course of inflation harder to predict. As a result, analysts and policymakers now form opinions about inflation after considering a wide array of economic variables, including labor market conditions (such as changes in employment, the unemployment rate, and wages), movements in the foreign exchange value of the dollar, real economic growth, growth in the M2 or M3 monetary aggregates, changes in private debt, and even past rates of inflation.

In addition to these "indicators," some also look at one or more commodity price indices to help them predict inflation. This *Letter* discusses why commodity prices might be useful indicators, as well as some of the problems with using commodity prices as leading indicators of inflation. It then evaluates empirically the improvement in inflation forecasts that a commodity price index can make.

The role of indicator variables

It takes about 18 months for a change in the direction of monetary policy to have a measurable impact on the price level. Because the effects of policy are not seen immediately, policymakers seek reliable leading information on the trend in prices to determine whether policy is on the right course. For this purpose, they use indicator variables. Trends in these variables bear some relationship to trends in overall prices and so, are useful in predicting inflation.

However, indicator variables are not operating targets the way M1 once was. Because the Federal Reserve does not set target ranges for these variables, their movements do not dictate any particular path for policy, but merely help to suggest whether the current policy stance is appropriate.

The supporting case

Some have argued that commodity prices, or an index of commodity prices, have several advantages when used as a leading indicator of inflation. First, commodity prices are reported on a more frequent and timely basis than are the inflation indexes themselves. Commodity price quotes are available daily, while the CPI is available only monthly and the GNP price indices are available quarterly. More importantly, commodity prices are flexible and adjust more quickly to changes in underlying fundamentals than do overall prices. Commodity prices adjust rapidly because many commodities are traded daily in highly active and sophisticated international spot markets.

Finally, commodity prices may be a good leading indicator of inflation since commodities are basic inputs to the production process. It is reasonable to expect shifts in aggregate demand to be reflected in the prices of commodities before those of finished goods.

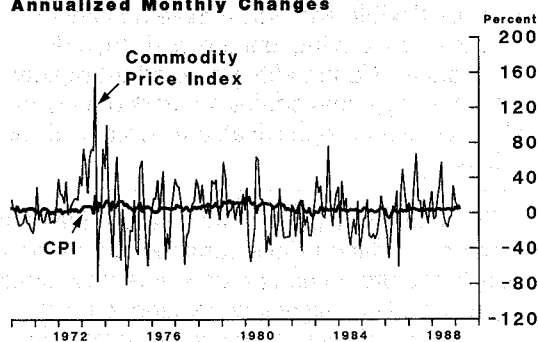
Indeed, Professor Jeffrey Frankel has shown that commodity prices initially should react more than proportionally to certain shocks such as a change in the supply of money. For example, if the money supply were to decline, the prices of all goods, including those of commodities, would be expected to fall proportionally in the long run. However, prices of some goods may adjust slowly in the short run, leaving the price level high relative to the new level of the money supply. As a consequence, interest rates could rise in the short run. The temporarily higher returns on financial assets would encourage

arbitrage between financial asset and commodity markets until commodity prices fell to the point that the expected future capital gains (less storage costs) from holding commodities equaled the higher return on financial instruments. In other words, *current* prices of commodities would fall below their expected long-run levels and then gradually rise.

Criticisms and qualifications

Some of the features that may make a commodity price index useful also present drawbacks. This is particularly true of the flexibility of commodity prices. Being flexible, commodity prices also can be very volatile. This can be seen in Chart 1. The thin line traces the annualized monthly growth rates for a widely-used index of spot prices, the Commodity Research Bureau Index (CRBI). This index is constructed using prices for 23 agricultural and industrial commodities, excluding oil. The heavy line traces the monthly growth rates for the CPI.

Chart 1
Annualized Monthly Changes

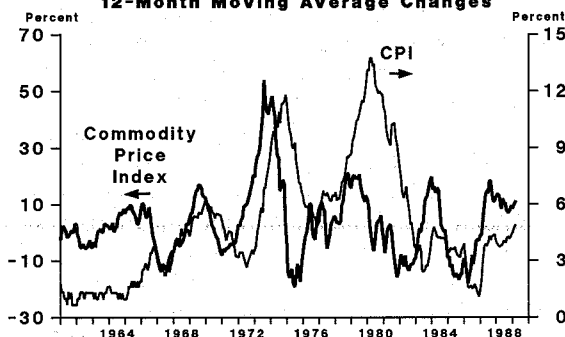


Over the period covered by the chart, the standard deviation of the monthly growth rates for the CRBI is almost 10 times larger than that for the CPI, even though the mean growth rates are not much different; growth in the CRBI averaged 4.7 percent, while the CPI averaged 5.5 percent. This volatility is not unique to the CRBI. Monthly growth rates for every well-known composite commodity price index vary much more than CPI inflation. This greater volatility makes it difficult to discern from short-run movements in a commodity price index the implications for overall inflation.

But, over longer periods of time, do changes in commodity prices reliably lead inflation? Chart 2

provides some perspective on this question. By focussing on 12-month moving average growth rates, the chart enables us to discern better the movements in commodity prices apart from the highly volatile month-to-month spikes in their growth rates. The chart shows that turning points in the growth rate of the CRBI always preceded peaks and troughs in CPI inflation. Thus, there is some evidence that the index could be useful as a leading indicator. Its lead over inflation, however, is not all that reliable. With a mean lead of about 11 months, the lead in the turning points of the CRB index ranges from two months to 20 months.

Chart 2
12-Month Moving Average Changes



Statistical evidence

Ultimately, the framework provided by macroeconomic models is needed to determine whether a commodity price index can improve policymakers' ability to explain and predict inflation. One study, reported in the Winter 1989 issue of this Bank's *Economic Review*, uses a vector autoregression (VAR) to predict inflation. The VAR includes a commodity price index along with variables like M2, unemployment, GNP, exchange rates, and interest rates.

The VAR results show instability in the relationship between the commodity price indices used and the CPI. That is, even when the effects of other macroeconomic variables are taken into account, swings in the inflation rate have tended to be much larger relative to a commodity price shock of given size after 1975 than before the mid-1970s. Chart 2 also shows this instability; the rise and fall in CPI inflation relative to the changes in the growth rate of the CRBI were much larger in the late 1970s and early 1980s than in the early 1970s. Such instability poses

serious problems for using commodity prices to predict inflation over a longer-term horizon.

However, this instability poses less problem in a short-term forecasting environment. For example, inclusion of a commodity price index in the VAR improves somewhat the out-of-sample forecasts of inflation up to eight quarters ahead.

Structural model

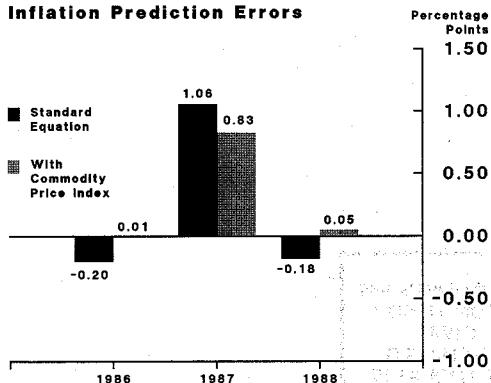
The contribution of a commodity price index to short-term inflation forecasts also can be evaluated by incorporating a commodity price index like the CRBI into a structural macroeconomic forecasting model such as the one developed at this Bank. (For a complete description of this model, see *FRBSF Working Paper 89-01*.) In the model, inflation, measured as the percentage change in the fixed weight GNP price index, is explained by past inflation, a measure of slack in the labor market, changes in real oil prices, and changes in the real dollar exchange rate. When this equation is augmented with the lagged changes in the CRBI that are not related to inflation equation, the changes in the index are statistically significant in explaining inflation. The estimate indicates that, on average, an unexpected 10 percentage-point increase in the growth rate of the commodity price index raises inflation by about 1/2 percentage point over a period of six quarters.

Moreover, including the commodity price index in the model's inflation equation reduces the forecasting error of the model. As an example of the contribution the CRBI can make, three separate, out-of-sample forecasts were made for 1986, 1987, and 1988. These are out-of-sample in the sense that the inflation equation is reestimated up to the beginning of each forecast period.

The forecast errors, fourth quarter to fourth quarter, are shown in Chart 3. The forecast errors from the equation augmented with the commodity price variable are somewhat lower than

those from the "standard" inflation equation, though the contribution of the commodity price variable can best be described as modest. In particular, the inclusion of information on past changes in commodity prices does little to lower the relatively large inflation forecast error for 1987. Coupled with the VAR results discussed above, the evidence in Chart 3 indicates that a commodity price index can be of some use in short-run inflation forecasts, but such an index is not a source of information that dramatically improves our ability to predict inflation.

Chart 3
Inflation Prediction Errors



Modest contribution

There is mild empirical support for using a commodity price index as one of a number of indicator variables for short-term inflation forecasts. However, evidence of the instability in the relationship between commodity prices and inflation means that a commodity price index is not useful for forecasts of longer-term trends. This, in turn, argues against using a commodity price index as a target of policy the way M1 once was used, or even giving it any special status relative to other indicator variables.

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